
REAL TIME:
A Study in Real-time Reporting and Real-time Auditing

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THESIS ABSTRACT

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(Summarize in the space below the purpose and principle conclusions of your thesis. Please single space and do not exceed 100 words.)

Audit and assurance services, as traditionally practiced, seems counterintuitive to the changing needs of the user for current information. The growing reliance of consumers and users on the Internet and its ability to provide up-to-the-minute information in a 'real-time' sense suggests a need for not only real-time reporting but also real-time auditing of financial information. This paper hopes to first examine the concept of Real Time and the effects of providing users with real-time information. This paper also examines the auditor's role within the boundaries of Real-time Auditing and what issues may be relevant towards its implementation. Finally this paper will examine possible implications of real-time auditing on the industry.

Adviser's Signature

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Dedications

This paper is dedicated to my late grandparents, whose memory I will always keep with me; and to my dad, who still doesn't believe that Real-time reporting will work, for his encouragement and opinions that have added a new dimension to this paper.

Introduction

Right here. Right now. Tailored for me. Served up the way I like it. If the new consumer's expectations were spelled out on a billboard, that is how they would read (McKenna 36).

- Regis McKenna

The information age (Moschella 121), as this era has been popularly named, has brought with it the realization of the need for better and faster information by investors. The advent of the Internet not only provides investors and financial statement users with a wealth of knowledge at their fingertips but more importantly, current information.

Audit and assurance services, as traditionally practiced, seems counterintuitive to this change in the needs of the current user. Despite the 'real-time' capabilities of the Internet, audited financial information is anything but. In a recent commentary by Robert Elliot, he contends that the increasingly widespread use of information technology and its growing power threaten auditors in several different ways:

“Early in the century, financial statements represented a large part of the information available to an enterprise's debt and equity investors. As accounting principles improved, the value of financial statements also improved. But, facilitated by information technology, other sources of relevant information are increasingly available; for example, investors can get up-to-the-minute data

about companies through public or proprietary databases without waiting for quarterly or annual reports. Moreover, information technology has created new ways for businesses to become more competitive (for example, continuous quality improvement, cycle-time reduction and enhanced vendor and customer relations), the effects of which are not reflected in the financial statements" (Elliot 1994, 74).

Elliot predicts that the audit is also threatened and that financial statements printed on an annual basis may be destined for "history's scrap heap" as information technology permits far more frequent and timely reporting (Elliot 1994, 75). The current practice of providing users of financial statements with information on a quarterly and yearly basis, does little in the way of providing up-to-date information that may influence the user's decision.

Up-to-the minute information retrieval by investors is not a futuristic or unrealistic concept. The popularity of the Internet and the world-wide-web provides users a medium that is, despite its limitations, real-time. Timely information has also been documented to be useful. An example of this is illustrated by Chrysler's stock raising 18% in 10 minutes upon the anticipated merge with Mercedes Benz (Andrews 6).

Investor wealth, it appears, can be created upon the immediate knowledge of such information. It is interesting to note that firms which currently practice providing additional voluntary information or disclosures

have been considered “high quality” firms and have been perceived by investors as being desirable (Meek 555), perhaps an example of the need to balance the scales of asymmetric information.

This evidence suggests that a real-time system is likely to be perceived by investors as being well managed firms and have higher than expected prospects for future profitability. The increasing volume of on-line trading and the continuing reliance of consumers and users alike on the internet as a means of information also suggests the need for public corporations to consider providing more relevant data on-line.

It is therefore necessary for auditors to consider their role in this world of real-time information and consider the increasing importance of the possibility of real-time auditing. The role of the auditor in a real-time reporting system may be passive by retaining the status quo and provide services only to validate the traditional financial disclosures and SEC reports. Alternatively, the role of the auditor could be proactive and design a verification system of those inputs and processes that could generate the information accessible in a real-time reporting system.

This paper hopes to first examine the concept of Real Time and the effects of providing users with real-time information. This paper also examines the auditor's role within the boundaries of Real-time Auditing and what issues may be relevant towards its implementation. Finally this

paper will examine possible implications of real-time auditing on the industry.

Real Time and Real-time Information: An Overview

Real time as McKenna puts it, is our sense of ultra-compressed time and foreshortened horizons in the years leading to the millenium (McKenna 4). The change in how we perceive time is the result of programmable technology that provides us with results at the click of a mouse or by simply touching a button. Real time occurs when barriers such as time and distance disappear and the flow from action to response is simultaneous (McKenna 5).

The concept of Real Time and real-time information is not as foreign or innovative a concept as the term suggests. Like all dissemination of information, the progression of technology improves not only the speed of delivery of this information, but the receiver's expectations of this information. Be it the progression from what is now termed 'snail mail' to email, from telegraph to telephone, and from newspapers to radio and television, the concept of Real Time and real-time information is prevalent in all of these examples.

Simply stated, what real-time information does at its most basic level is *to provide relevant information on a timely basis*. The benefits of this may be inferred by using simple analogies to other forms of

technology that have progressed to Real Time. Banks, for example, have raised customer expectations of banking hours from 8 hours per working day, to 24 hours of non-stop available service with the introduction of ATMs; television helps to disseminate relevant, timely information that would otherwise not be achieved through the use of newspapers. Like the 'historical time' (as opposed to Real Time) feel of printed newspapers when compared to television, printed financial statements do little in the way of providing current information. If one could liken a material corporate incident to a sudden weather catastrophe, last year's sunny financial statements are not equipped to warn a user of an upcoming tornado.

The current method of reporting not only seems inappropriate in this day and age but also more importantly, artificially divides time into arbitrary milestones. Business today is a continuous cycle that encompasses all events ranging from a competitor's disruptive strategic actions to seasonalities that may be inherent to an industry. By looking at the performance of a company in terms of quarters or years that may overlap irrelevant periods is not only of little value to a decision-making process, but does little to help facilitate a relevant analysis. An example of this is the motion picture industry, which uses a special method of accounting to record revenues that does not fit neatly into a traditional business cycle. Like several other industries, the uniqueness of

accounting for the motion picture industry poses problems for financial users and analysts who constantly readjust quarterly and annual financial information to compensate for this.

Investors are a heterogeneous group with different tastes and preferences, wealth, beliefs, access to financial information, and skills in interpreting financial information. These factors can affect their demand for financial information. The demand for financial information may also be a function to the extent to which the investor adopts an “active” versus “passive” trading strategy. Under a passive trading strategy, the investor essentially buys and holds a security and anticipates little trading until it's liquidation. Often passive investors purchase mutual funds to diversify risk and return. By contrast, an active trader has a speculative demand for information. In other words, an active trading policy involves continually seeking information that will permit the detection of mispriced securities and continually trading on such information. In many cases, an active trading policy is attempting to take advantage of perceived short-term mispricings in security markets. Thus, information, which helps predict short-run movements in stock prices, is of interest to active traders, but it would not be of interest to the investor who follows a passive policy and tend to adopt a longer-term perspective.

Unfortunately, our conventional reporting system only generates homogenous reports in a standardized format (i.e., a balance sheet

statement of cash flows, and an income statement, all of which are prepared in accordance with GAAP). Investors are forced to accept such structured information to satisfy their vastly different information needs and investors are forced to look beyond conventional financial reporting if their unique needs are not satisfied.

Choice, as McKenna puts it, gives the customer power. An empowered customer eventually becomes a loyal customer by virtue of being offered products and services that have been customized to meet his or her needs (McKenna 38). In other words, a company that not only offers its customers choice - but *specialized and customized* choice - is more likely to appeal to an investor.

One of the greatest benefits of a real-time system may be its flexibility and ability to satisfy differing investor needs by providing choice. A real-time system would be flexible enough to incorporate and adapt to the user's needs and expectations. Given the near immaterial costs of storage of electronic information, firms may be able to provide huge databases of financial information to allow investors to custom design their own financial reports. For example, investors that seek a "passive" trading strategy could generate a customized report dealing with firm and market performance measures for peer groups (e.g. industry comparisons), by risk (e.g., using Beta or EVA® analysis), and over extended periods of time. For investors that seek an "active" trading strategy, customized daily,

or hourly, reports could be tailor-made to meet such needs as predicting shifts in liquidity, profitability, productivity, environmental, market shifts, or customized searches on the world-wide-web.

While the examples provided might make a real-time system sound attractive and potentially rendering the current system obsolete, there are costs involved in moving to such a system:

1. **Opportunities for false reporting** – During the transition phase from an established system to a new reporting system, opportunities may arise for fraudulent reporting and manipulation by management. Such incentives to defraud create a demand for real-time auditing.
2. **Loss of competitive advantage** – A real-time system by providing more complete data may jeopardize a firm's competitive advantage. In other words, by voluntarily disclosing information dealing with profit margins or specific products, or even sales volumes in certain markets, a firm's competitors would be able to access this information and have a better understanding of the strategic goals and objectives of a firm.

As Elliot puts it (Elliot 1995, 122), it is natural that companies will not want to reveal data that may be competitively damaging and that no one wants to damage corporate vitality. Competitive data, however, can be screened and selective access can be

otherwise refined. More importantly, attitudes towards what is considered competitively disadvantageous are very likely to change as cycle times for new products and services rapidly diminish.

- 3. Risk of asymmetric information** – A real-time system needs to be designed to provide total access to all investors. Deviating from this may provide a vehicle for firms to disseminate insider information to selective investors. Such a system would be illegal. In other words, given the existence of insider trading under current practices, it is imperative that a real-time system is not designed to filter information or restrict its availability to all investors. Given the broader and more accessible information that a real-time audit system provides, failure to account for this problem may further heighten the proliferation of insider trading.
- 4. The Litigation Problem** -The threat of litigation has deterred many CPAs from expanding the attest function. Implementation of the real-time audit could lead to even more litigation than is currently faced by the profession. Elliot (1994, 77) proposes three reasons to proceed with the development of these opportunities. Firstly, the profession is currently making concerted efforts to achieve a reasonable liability standard for attest work and improvements are very likely. Secondly,

developing these opportunities will take some time, during which technology -based competitors may emerge. Finally, Elliot's proposed services (including real-time audit) should minimize litigation, the majority of which reflects investor disappointment with the lack of sufficient warning of risks leading to lost investments.

5. **Security** – Security over the inputs and access to a real-time system would be essential given the added likelihood that such a system would provide hackers the opportunities to penetrate a client's information system or alter reported results.

Real-time information is advantageous for many valid reasons.

Interestingly enough, the application of the conceptual framework illustrates its usefulness and validity. Under 'Relevance', the conceptual framework provides a case for relevance by expounding the usefulness of predictive value, feedback value and timeliness, which will be discussed in the next section.

Real-time Reporting: Relevance and Reliability

Relevance has been defined in a myriad of ways. At its most basic, relevant information is information that has a bearing on the matter at hand (Hendriksen 133).

Information is influential in at least three ways: by affecting goals, by affecting understanding, and by affecting decisions. Each provides a definition of relevance (Hendriksen 133).

"Qualitative characteristics are "attributes of accounting information which tend to enhance its usefulness. Such qualitative characteristics might be expected to be

- a. Able to withstand the test of time.
- b. Pervasive - that is, apply to all accounting entities.
- c. Implementable - that is, capable of applications and susceptible to objective verification."

The FASB places itself firmly on the side of decision relevance when it defined the term as the capacity of information "to make a difference" (SFAC 2, par. 46) in a decision.

The FASB also goes on to argue that this difference is possible by "helping users to form predictions about the outcome of past, present and future events or to confirm or correct prior expectations," In addition to the predictive and feedback value of information, it must also be timely.

The conceptual framework has been around for at least two and a half decades but despite its age, it is still very relevant to the concept of Real-time reporting. As previously mentioned, there are three components which go into making up Relevance as defined by the FASB:

1. **Predictive Value** - this concept is derived from investment valuation models and is defined by the FASB in the glossary to SFAC2 as:

The quality of information that helps users to increase the likelihood of correctly forecasting the outcome of past or present events.

For accounting data to be relevant in the decision-making process of investors, this information must provide input into investors' decision models (Hendriksen 134). And since only expectations of accounting data are to be relevant, they must provide or permit predictions of future objects or events. Predictive value not only illustrates the need for relevant information but also implies the need for customization to provide meaningful input for investor decisions.

2. **Feedback Value** - information also has an important role to play in confirming or correcting earlier expectations (Hendriksen 136). As the decision-making is seldom based on decisions made in isolation, information about the outcome of one decision is often a key input into making the next decision. This type of information is called feedback.

3. **Timeliness** - Information cannot be relevant if it is not timely, that is, it must be available to a decision-maker before it loses its capacity to influence decisions (Hendriksen 136). Although timeliness does not necessarily guarantee relevance, relevance is not possible without timeliness. Timeliness is therefore an important constraint on the publication of financial statements and subsequent publications as Hendriksen puts it, should be as rapid as possible to ensure the availability of current information to the user.

The information age is unique in that it makes almost any information accessible to the user and at greater speeds and at lower costs. Despite the time that has passed since the FASB's definition of Relevance, if one were not privy to this knowledge, one would assume that this definition was design to support the concept of Real-time information. Each of these components, whether directly or indirectly, suggests speed is imperative to the relevance of information. However, at the time that the Conceptual Framework was conceived, it is clear that the not only would the costs associated with the concept of real-time information far outweigh its benefits, it is also likely that the appropriate technology was not available.

In the definition of timeliness, according to Hendriksen, it goes on to say, "timeliness also implies that financial statements should be presented at frequent intervals so as to reveal changes in the firm's situation that may in turn affect the user's predictions and decisions (Hendriksen 136)." This implication is paramount to the concept of real-time information and real-time auditing, and is clearly contradictory to the current practice of quarterly and yearly intervals.

Real-time Auditing: an overview

According to Helm (Helm 47), auditors in the near future can expect most accounting transactions to be in electronic form without the need for

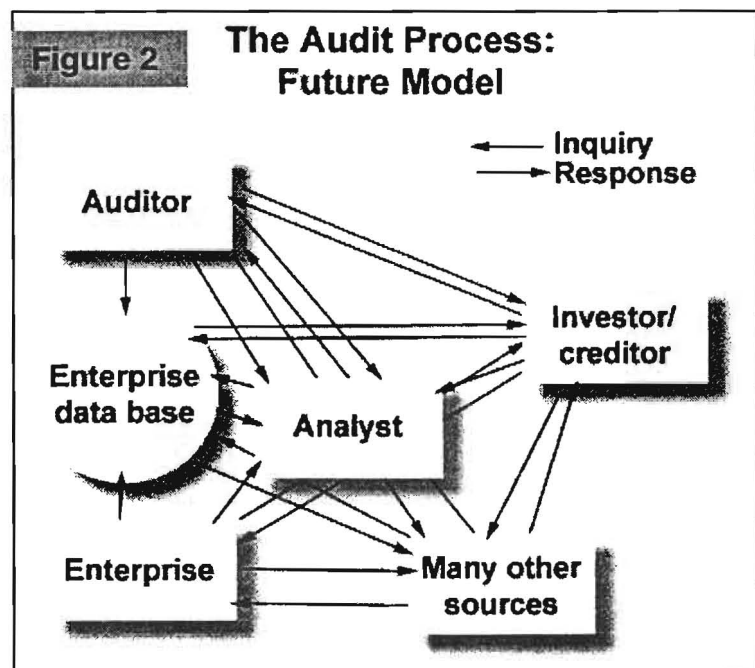
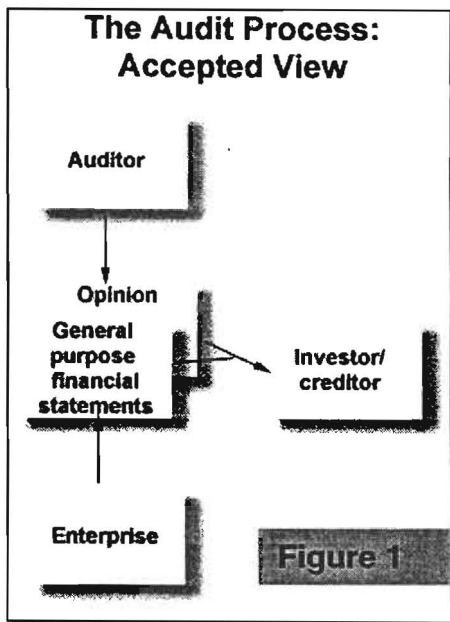
paper documentation as electronic storage is more efficient. Helm goes on to contend that in today's continuously moving technology-driven world of financial statements, auditors may have to revise traditionally used audit time schedules and perform these test on a continuous basis.

The concept of Real-time auditing is perhaps best described as a service of continual assurance of the reliability of information put out by a firm that an auditor provides the user.

Although the current audit process may provide the user with some level of assurance, it is only an assurance on the reliability of the information. In a study of the audit-assurance environment, it showed a shift in information user's needs away from "assurance about reliability and more need for relevance (Elliot 1995, 120)." This, the study reveals is not surprising in that computerized information is less prone to errors than manually prepared information¹. In addition, the increase in available information for the user to choose from, the increasingly complex and fast changing conditions that affect the decision-making process places a premium on relevance.

The current audit process of providing assurance on quarterly and yearly basis and in so doing reducing the role of the user to that of a passive recipient seems outdated and on the verge of becoming obsolete. In Figure 1, adapted from Elliot, the accepted view of the audit process

which depicts the passive recipient of audited financial statements (Elliot 1995 121). This diagram not only does little in reflecting future audit models, but is also inappropriate by current standards given the level of technology available. Figure 2, the Future Model, also adapted from Elliot, is a more realistic model incorporating real-time reporting and real-time auditing (Elliot 1995 121). Elliot goes on to say that online investors as depicted in the Future Model will create their own presentations according to individual needs, which would be comparable to what we now consider financial accounting (Elliot 1995 121).



¹ Virtually all major firms don't employ "manually prepared information".

Despite the increasing use of computer technology to streamline processes and computerized tasks that were previously performed manually, these changes, although moderately successful, seem to fall into the realm of the many examples of unsuccessful technological implementation: failure to rethink the system given the level of technology. The concept of real-time auditing goes beyond simply computerizing the audit process. Preventive controls are especially important if we are to realize the potential of electronic commerce (Elliot 1995, 125). By focusing on perhaps evaluating the audit process itself, and deciding how audit procedures may be enhanced to incorporate technology, the audit focus may perhaps be allowed to shift away from the end product (i.e. the financial statements) and to what precedes it - internal controls. In 'The Prince' by Niccolò Machiavelli, the famous political strategist suggests that "the end justifies the means", the concept of real-time auditing takes the audit process and hopefully, the role of the auditor to a new level - where the means justifies the end.

Under a conventional auditing approach, the auditors employ a mixture of test of controls, analytical reviews, and detailed test of year-end balances. The final series of testing, the detailed test of year-end balances represents a substantial amount of time and evidence gathering commonly illustrated by physically counting inventory, sending confirmations, or recomputing calculations. The purpose of these steps is

to validate those items on client's fiscal year end balance sheet and/or income statement. In addition, auditor procedures such as physical counting or confirmation, while having high credibility and validation appeal, are very costly and time consuming.

Under a real-time reporting system, a firm would be providing instantaneous disclosures over the worldwide web and the auditor will not have the luxury or time to employ such traditional audit procedures like physical counting or confirmations. Any audit procedures to detect and correct potential misstatements must be made before the data is publicly disseminated. Thus, an auditor would also have to rely solely on auditing procedures dealing with test of controls and analytical reviews and virtually abandoning any detail testing of year-end balances.

Real-time Auditing: Pre-implementation Issues

I INTERNAL CONTROL

It is evident that the implementation of a Real-time audit system would require a shift away from traditional audit procedures that include detailed quarterly and yearly audits of financial statements, to a markedly greater reliance on internal controls. The importance of internal control to an auditor is rooted in the second standard of field work, which states "A sufficient understanding of internal controls is to be obtained to plan the audit and to determine the

nature, timing, and extent of tests to be performed” (Messier 188).

Because of this shift, it would be prudent for an auditor to determine if a company meets the requirements for a successful implementation of a real-time audit system. To gain some understanding of the processes and procedures involved in considering a firm for a Real-time audit system it is helpful for us to examine some aspects of internal controls.

Test of Controls. Test of controls consists of procedures directed toward the evaluation of the effectiveness of the design and operation of internal controls (AICPA AU 319). When tests of controls are directed toward design issues, the auditor is concerned with whether the control has been properly designed to prevent or detect material misstatements.

Determination of a control conscious environment

The control environment sets the tone of an organization by influencing the control consciousness of people (Pany 271). It is the foundation for all components of internal control, providing for discipline and structure. The importance of control to an entity is reflected not only in the overall attitude to, but also in the awareness of, and actions of the board of directors, management and owners with regards to control. The control environment can be thought of as an umbrella that covers the entire entity and

establishes the framework for implementing the entity's accounting systems and internal controls (Messier 189).

Integrity and Ethical Values. The effectiveness of an entity's internal controls depends upon the integrity and ethical values of the individuals who create, administer; and monitor the controls (Pany 272). An entity needs to establish ethical and behavioral standards and communicate these to its employees while reinforcing these standards on a daily basis. For example, management should take action to remove incentives or temptations that might lead personnel to engage in dishonest, illegal, or unethical acts. Some examples of incentives that may lead to unethical behavior include pressure to meet unrealistic performance targets and high performance-dependent rewards. Examples of temptations include an ineffective board of directors, a weak internal audit function, and insignificant penalties for improper behavior within an entity through the use of policy statements and codes of conduct (Messier 190). A control conscious environment is key to the implementation of the real-time audit system as it requires that management is ethical enough to incorporate information into the system regardless of its effects on the position of the company. In

other words, should management choose not to close entries of financial information that is deemed to have a negative effect on a firm's position, this would defeat the purpose of a real-time system and mislead its users.

Risk Assessment

The second component of internal control is risk assessment. When assessing risk the auditors should carefully identify and analyze factors that affect the risk that an organization's objectives will not be achieved, and then try to manage those risks (Pany 276).

An entity's risk assessment process should include considering both external and internal events and circumstances, that may arise and adversely affect its ability to record, process, summarize, and report financial statements. Risk can arise or change due to the following circumstances (Messier 192).

- ***Changes in the operating environment.*** Changes in the regulatory or operating environment can result in changes in competitive pressures and the creation of significantly different risks.
- ***New personnel.*** New personnel may have a different focus on or understanding of internal control.

- ***New or revamped information systems.*** Significant and rapid changes in information systems can change the risk relating to internal controls.
- ***Rapid growth.*** Significant and rapid expansion of operations can strain the controls and increase the risk of a breakdown of controls.
- ***New technology.*** Incorporating new technologies into production processes or information systems may change the risk associated with internal control.
- ***New lines, products, or activities.*** Entering into business areas or transactions with which an entity has little experience may introduce new risk associated with internal controls.
- ***Corporate restructuring.*** Restructuring may be accomplished by staff reductions and changes in supervision and segregation of duties that may change the risk associated with internal controls.
- ***Foreign operations.*** The expansion or acquisition of foreign operations carries new and often unique risks that may impact internal control.
- ***Accounting pronouncements.*** Adoption of new accounting principles or changes in accounting principles may affect the risk involved in preparing financial statements.

Control Activities

Control activities are the policies and procedures that help ensure that management's directives are carried out (Pany 277).

Control activities that are relevant to the audit include:

Performance Reviews. A strong accounting system should have controls that perform independent checks on the performance of the individuals or processes in the system (Messier 193).

Performance reviews provide management with an overall indication of whether personnel at various levels are effectively pursuing the objectives of the organization (Pany 278).

Information Processing. There are two broad categories of information systems control activities: *general controls* and *application controls* (Messier 193). General controls relate to the overall information-processing environment and include controls over data center operations, system software acquisition and maintenance. For example, an entity's controls for developing new programs for existing accounting systems should include adequate documentation and testing before actual implementation.

Application controls apply to the processing of individual applications and help to ensure the completeness and accuracy of transaction processing, authorization, and validity. Two examples are: (1) the entity should have controls that ensure that each

transaction that occurs in an entity's accounting system is properly authorized and (2) the entity should design documents and records so that all relevant information is captured in the accounting system.

Physical Controls. These controls include the physical security of assets. Physical controls may include adequate safeguards, such as secured facilities, authorized access to computer programs and data files, and periodic counting of assets such as inventory and comparison to control records.

Segregation of Duties. It is important for an entity to segregate the authorization of transactions, recording of transactions and custody of the related assets. Independent performance of each of these functions reduces the opportunity for any one person to be in a position both to perpetuate and to conceal errors or irregularities in the normal course of his or her duties.

II AUDIT RISK

Risk, the second fundamental concept that underlies the audit process, consists of two major risk types that an auditor may face when engaged to audit a set of financial statements (Messier 84): *audit risk* and *business risk*. However, it is likely that business

risk is of greater significance when auditor is assessing risk in the pre-implementation phase of a Real-time audit system.

Business risk is defined as “the exposure to loss or injury to professional practice from litigation, adverse publicity, or other events arising in connection with financial statements audited and reported on” (Messier 84). It is generally considered that business risk cannot be controlled directly by the auditor, who instead has only some control in terms of control exercised when accepting and retaining clients. In a Real-time audit system, this assessment of client suitability to control business risk becomes all-important. Part of this is due to the problems that are unique to the Real-time audit system that include, for example its inability to audit certain industry types (discussed below). The audit risk model may be appropriate in aiding an auditor’s assessment of a potential client.

III SUITABILITY OF INDUSTRY

In addition to stringent internal control requirements, the Real-time audit system is not suited for all industries, unlike current audit practices, which may be adapted to fit any industry type. An auditor may need to consider certain industry-related factors before arriving at a decision to implement a Real-time audit system.

Rate of Change – The rate of change in the industry is perhaps a major deciding factor for considering a Real-time audit system. In general, industries that are subject to rapid change are more likely to have materially misstated financial statements (Messier 93). If a Real-time audit system is implemented in such an industry, these misstatements are likely to be compounded and remain undetected as a result of the system's reliance on internal controls. In addition, industries that experience high volatility such as the casino industry, may also be poor candidates for a Real-time audit system.

Distressed Industries – If an industry is considered to be distressed, the risks of material misstatements are higher than when the industry is financially sound (Messier 93). Issues such as inventory valuation may arise where the proper market valuation of a firm's industry may be questionable.

Profitability of a firm – A firm's profitability compared to the industry as a whole may provide an auditor with information pertaining to the adequacy and consistency in earnings.

It is likely that in each case, although the firm may desire a real-time audit system and may benefit from this system, the auditor can decide not to implement it, given the volatility that each of these scenarios might pose to the real-time audit system.

IV Cost/Benefits Analysis – It is likely that certain industries may not benefit from implementing a Real-time audit system. For example, not-for-profit organizations, where the cost associated with implementing a Real-time system is likely to greatly exceed the benefits derived from it, and traditional financial audit services prove adequate. In addition, with the higher start-up costs and capital investment necessary for implementing such a system, low to mid-size firms are also unlikely to benefit from this proposed system.

Real-time Auditing: Implementation Issues

I AUDITOR MATERIALITY

Unlike materiality in traditional auditing, Real-time audit systems allow little room for material misstatements. As a result, an auditor may choose to assess materiality as being much lower, allowing for a smaller margin of error. Materiality is defined as “the magnitude of an omission or misstatement of accounting information that, in light of surrounding circumstances, makes it probable that the judgement of a reasonable person relying on the information would have been changed or influenced by the omission or misstatement” (Messier 74). As a real-time information system would provide for updated information on a continuous

basis, an error, regardless of size or materiality, is likely to compound itself and eventually become material. By establishing a lower level of materiality, the auditor provides little room for error and thereby reduces detection risk or the risk that an auditor will not detect a material misstatement that exists in the financial statements, or in this case the informational database.

II SECURITY & CONTROLS

The importance of electronic security cannot be emphasized enough. This area includes the policy and procedures for ensuring that access to equipment, software and data is restricted to authorized users. Controls such as firewalls, encryption and authentication should be employed. Firewalls, a commonly used safeguard, consists of software and hardware applications that separates a network segment (such as a Web site) from the main network (Helm 47). If an application contains an embedded audit module that includes the auditor's selection criteria, the auditor may employ the use of passwords to restrict access to source code and procedures to prevent unauthorized modification to the embedded audit module (Helm 47).

Software and physical rescues require controls to prevent intentional or unintentional modifications or destruction of any

resources (Helm 45). This is necessary to prevent fictitious or erroneous transactions from finding their way into the financial accounting system.

An auditor may also consider a backup system or a 'mirror-site' that can be accessed only by the auditor. By including this feature, an auditor may perhaps use software to run a comparison between the main database and the auditor-only database to ensure that data written to the main database has not been tampered with.

A good design, according to Elliot would employ devices that would thwart intruders attempting to breach security and otherwise violating the integrity of the system (Helm 1995 125). Sensors should detect changes in physical conditions and software agents can identify changes made to data and files by activating notifications to designated parties (Helm 125). This, Elliot believes will play a great role in enhancing reliability through design and real-time auditing.

Image processing, a technology which involves the conversion of paper documents into electronic form through scanning, is ranked in importance with Electronic Data Interchange technology, or EDI. A key issue in image processing is document authenticity (Helm 46). In other words, is the electronic image

actually what it claims to be, or has it been subtly altered? The auditor thus needs to test controls that provide assurance that only valid and authorized documents are scanned into the system. A quality function (Helm 46) is also needed to ensure that scanned images are captured error-free before the paper documents are destroyed. SAS no. 80, Amendment to Statement on Auditing Standard no.31 on Evidential Matter provides guidance on image processing issues. SAS no.80 also address the implications of electronic evidence on audit and auditors employ information technology to obtain evidence supporting electronic transactions.

Outsourcing, a common practice that involves external consultants to perform data processing services, which include development, operations, programming and systems analysis also, poses a control risk. In this case, there may be a risk that these external consultants are not subject to controls that as stringent as those used in-house (Helm 47). SAS no. 70, Reports on the Processing of Transactions by Service Organizations as well as the APS on implementing SAS no.70 and consider relying on the service auditor's report. The auditor might use it as a source of information for better understanding the service organizations' controls and might also consider performing tests of controls at the both the user and service organization (Helm 47).

The auditor might also consider obtaining an understanding of the significant applications performed by end-users. These might include ensuring that passwords are implemented and that applications installed are adequately tested and provide for proper documentation (Helm 47).

III RIGOROUS SYSTEMS TESTING

The auditor should begin rigorous testing of the real-time system before it is launched. This would include checking for reliability in the system's updating and processing functions. The auditor will also need to run a series of test that incorporate a list of possible scenarios that the real-time auditing system might face such as inappropriate entries (text entered into a numbers only field) or extraordinary events such as unauthorized entry into the system. Only after positive testing of the system should an auditor consider launching the real-time system.

IV LAUNCHING THE RTA SYSTEM IN STAGES

The auditor should implement a system of launching the real-time auditor on in stages on a limited basis. For example, this will include in chronological order:

- 1) Internal Audit Launch – allows for a firm's Internal Audit to test the system and its reliability
- 2) Company-Wide Launch – to facilitate usage on a company-level
- 3) Select-Investor Wide Launch – to test the reliability of the system on select basis, for example, minority shareholders
- 4) Sample Testing – successful completion of the first three would be followed by sample testing to ensure accuracy and reliability of the real-time audit system
- 5) Internet Launch – only positive reviews from field-testing of the first four will initiate this step

Real-time Auditing: Post-implementation Issues

ON-SITE AUDITORS

The implementation of a real-time audit system poses a commitment to an auditor that is incomparable to current audit practices. Although CPA firms provide many large corporations with year long on-site auditors, who provide audit services, the functions of a real-time auditor will be unique. Unlike his or her current counterpart, the real-time auditor needs to be specialized not only in a type of industry but requires Computer Information Systems and Management Information Systems related skills. In other words, unlike the current auditor, the real-time auditor does not actually perform the audit but becomes a partner in

supervising the audit performed by the real-time audit system. The duties of the auditor would not be to gather information or check for materiality, but rather to ensure that the real-time audit system is functioning at it optimal level on a daily basis. This would include running tests on the system to ensure reliability and 'hacking' the system to ensure security.

The on-site auditor may also consider interim manual audits to test for reliability of the system.

Real-time Auditing: Features of the real-time audit system

I RELEVANT RANGE TESTING

One method of ensuring a high degree of reliability would be to implement reasonableness tests flags within the real-time audit system to by employing the use of relevant range testing. What this entails is a system of dynamically including relevant ranges for each item. For example, in the case of Sales Revenue the real-time audit system would track on a daily basis a range of revenues that are booked and incorporate these highs and lows to prevent entry errors. Using the same example, if a firm has historical Sales between \$100,000 and \$200,000 on a daily basis, any entry outside this range is automatically considered suspect and would 'flag' the auditor by perhaps providing an audit trail of this information to the auditor for immediate consideration. This system should also be

dynamic in the sense that relevant ranges are updated continuously based on the company's performance. In other words, the system should be intelligent enough to account for growth and seasonality within the industry and the company. This will prevent the real-time audit system from not only incorporating erroneous entries by 'testing' the entry but also allows the system to learn by facilitating otherwise ordinary changes in trends. Key risk and performance indicators can also be monitored by sensors and software agents (Elliot 1995 125) with reports at predefined tolerances. Some examples would include, cycle-time increases, level of foreign currency exposure, excessive reject rates and disappointing customer satisfaction ratings could all be detected as promptly as management believes is necessary for corrective action (Elliot 1995 125). It is important for us to recognize that although the system hopes to incorporate devices for the detection of misstatements or errors, SAS no.53, *The Auditor's Responsibility to Detect and Report Errors and Irregularities*, still applies. According to SAS no.53, it recognizes that since the auditor's opinion is based on the concept of reasonable assurance, the auditor is not an insurer and his or her report does not constitute a guarantee. Likewise, the real-time audit system should be viewed as a system of broadening

analytical tools and tightening controls and not as a guaranteed system.

II ELECTRONIC CONFIRMATIONS

Unlike traditional confirmation methods, the real-time audit system incorporates validity automatically into the system by requiring updates from reliable third parties when necessary. For example, consider confirmation procedures for testing the Investment account: the auditor decides on a sample of investments from the Investment account, uses a reliable source such as the Wall Street Journal to test for valuation by using closing prices to check against computations performed by the firm. The auditor then sends a confirmation request to the firm's brokers to test for validity. In a real-time audit system, this drawn-out two-step process is performed on a daily basis. First, requesting electronic closing prices from a reliable third party (i.e. Bloomberg) to compute closing values (valuation); the system then waits for an electronic update from the firm's brokers (validity), compares closing prices and new values to those computed earlier before updating its database. This method not only cuts down on confirmation time but also meets validity standards by providing for unbiased third-party verification.

Implications of Real-time Auditing

As with any form of technological progress, or simply progress for that matter, the ramifications of these changes can never be completely predicted. The implementation of the proposed real-time audit system is no exception, and is likely to revolutionize the industry.

- 1) **Auditors' Competencies** – Perhaps one of the more obvious implications of the real-time audit system is auditors' competencies. The added focus on technology requires skill sets that are not generally as essential to current auditors. The AICPA Special Committee on Assurance Services, which was set up in response to decline in the market vitality of the audit, has included the study of auditors' competencies among its line of research (Elliot 1995 123). The idea behind this task according to Elliot was twofold. First, knowledge of CPA's capabilities can contribute to designing services. Second, knowledge of CPAs' capabilities is essential to assessing the feasibility of proposed services and the type of training needed to provide this service (Elliot 1995 123). In figure 3, adapted from Elliot, gaps between competencies an auditor today possesses and those that will be needed in the future imply the need for, as Elliot puts it, a migration strategy for the profession (Elliot 1995 123).

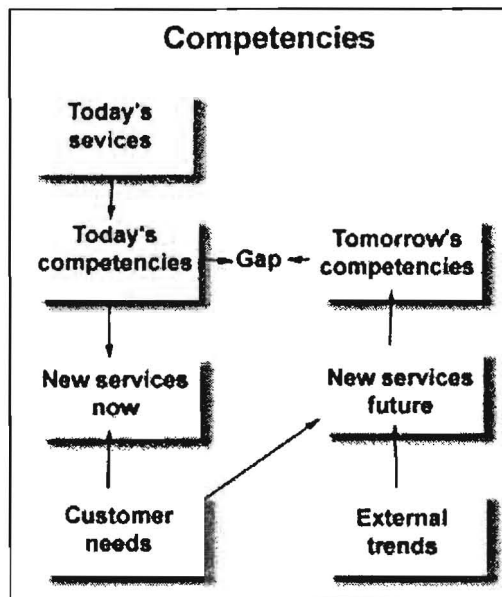


Figure 3

Figure 4 shows examples from two sets of high opportunity skills that can contribute to new assurance services. Those in which CPAs may be relatively weak in (advanced analytical skills, right-brain skills, and technology) are tomorrow's competencies.

Competencies		
	Weak	Strong
High opportunity	Advanced analytical skills Right-brain skills Technology	Ethics and integrity Left-brain skills Model building Verification
Low opportunity		FASB technical-rules mastery AICPA rules mastery

Figure 4

According to Elliot, if this projection is accurate, the profession will have to close the gap on these competencies (Elliot 1995 123). Although low-opportunity competencies² in which the profession is strong are still essential to the maintenance of the current audit function, these skills are unlikely to contribute to future services (Elliot 195 123).

2) **Academia (Coursework)** – With the need for an improved set of competencies, it is likely that the auditor of the future will be required to receive training in a wider range of skill sets that would incorporate greater emphasis on technology and management of information systems. It is likely that in the intermediate-term future, there will still

² Low-opportunity, weak competencies are theoretically limitless and not worth illustrating (Elliot 1995 123)

be a need for audited financial statements. These statements will still continue to be valuable despite its inability to facilitate 'real-time'. As a result of this, there will continue to be a need for course work in auditing financial statements. However, as the attest function begins to broaden to the assurance function (Elliot 1995 123), it seems likely that future professionals will receive training outside of the traditional scope of audit. Elliot provides a partial list of customer needs that would affect curriculum, which include: decision model selection and specification, information sourcing, information analysis and interpretation and outcome feedback.

- 3) **Academia (Research)** – Academic research could be employed to play a major role in aiding practitioners in the customer-driven services of the future. According to Elliot, some of research opportunities include relevance enhancement and decision processes and how they will change under the influences of information technology (Elliot 1995 124). Elliot goes on to provide a partial list of technology-focused research, which include real-time auditing and new modes of enhancing reliability through design. It would appear that a shift in focus on these issues would break down the long-standing issue of relevance of academic research on accounting and auditing to practitioners as it is clear that opportunities for research needed by practitioners are now building up (Elliot 1995 124).

4) **Niche Auditing** – The high cost of implementing the real-time audit system as well as the specialization required, is likely to affect the profession to a greater extent than the initial forming of the Big 6.

i) **Industry Specialization** -The complexities of implementing a real-time audit system to cater to the nuances and idiosyncrasies of each industry will most likely usher in an era of Niche Auditing. Since the real-time audit system is unlikely to be generic in design, or a one-size-fits-all system, CPA firms may find it beneficial to cater only to certain industries and sub-industries while still providing a high level of quality of assurance. However, it is likely that with experience and knowledge gained through implementation, this phenomenon will only occur in the short-run.

ii) **Inability of smaller CPA firms to compete** - A by-product of this effect may also be the inability of smaller CPA firms to compete against the larger CPA firms. As the real-time audit system requires a higher cost of implementation and a greater need for technical skills, the smaller CPA firms may need to specialize in meeting the needs of smaller businesses that do not require or can not afford real-time auditing.

iii) **Decline in Auditor Shopping** – Due to the longer more involved process and the higher cost of implementing the real-

time audit system, it is likely that firms may feel less inclined to switch auditors. Also, the likelihood of industry specialization by the CPA firms in the short-run may limit a firm's ability to switch auditors.

Conclusion

Is there a demand for real-time auditing? It is interesting to note that the industry realizes that the demand for traditional audit work is waning (Craig 20) and that there is a need for real-time auditing, but demand for on-line real-time auditing systems will require new competencies, as discussed previously in the Implications of real-time auditing.

In article in 'Accounting Today' ("CPAs demand new rules for online era", 33), practicing CPAs believe that accounting standards-setters should be developing new rules for the Internet Age that cover financial statements published electronically. The article also mentions a survey by the Illinois CPA society revealed that 71 percent of members surveyed believe that a CPA firm should be responsible for the financial information covered by its report published electronically. In addition, about 61 percent of CPAs surveyed worried that a firm could fraudulently publish financial statements claiming that these statements were audited by an accounting firm that actually had no connection with the company. These fears

highlight the need for a revision of auditing standards to incorporate the implications of the Internet and of real-time auditing to create a standard that would prevent false claims that certain companies may purport.

As far-fetched as real-time reporting and the real-time audit system may sound, the continual innovation of technology, increased Internet usage and higher customer expectations seem to lead to its inevitability. Recent forecast of the number of Internet users in the US by the year 2002, are estimated to reach 85 million, up 300 percent from 1997's 28 million users; worldwide this number is estimated to be over 60 million as of mid-year 1998 ("Net population" 40). This evidence not only illustrates a growing reliance on the Internet but the need for reliability of information on the Internet.

The future of real-time auditing seems to be closer than we might expect. In a recent Industry Week article (Kroll 42), Big 5 accounting firm Deloitte & Touche, has implemented a near real-time system with its Minneapolis-based client, Honeywell Inc. This has been achieved by linking the companies electronically enabling Honeywell's numbers to be available on a near real-time basis. The result, according to the article, has been an enhanced ability to determine the impact of such changes on the financial statements before they occur. Knowing about upcoming changes has also helped Honeywell's director of corporate reporting and accounting operations, Phillip Billiam prepare the operating units.

Honeywell expects that these changes will not only benefit its firm, but also the investor.

Consumers always want more choice, however consumers today that are burdened by choice are beginning to look for *meaningful* choice (McKenna 89). The real-time audit system, unlike its current counterpart, provides meaningful choice not only by stressing reliability but also emphasizing relevance through speed of delivery and customization. Real-time technologies will allow customers to satisfy many of their own needs themselves (McKenna 142). The audit profession must prepare itself for this change by understanding the basic idea of real-time:

“Real time is not about simple acceleration or mere doing faster what organizations have done before. Nor is it specifically about the Internet...Companies best equipped for the twenty-first century...will understand that real time is about exceptional responsiveness. (McKenna 11)”

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